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### Claims

1. Reactor for carrying out photocatalysed reactions in liquid or gaseous reaction media, consisting of a reactor vessel with a solid photocatalyst (PC), feed lines and take-off lines, mixing means, and a means of supplying electromagnetic radiation, **characterized** in that microradiators (MR) are present which are suitable for absorbing the electromagnetic radiation and, with a time delay, for emitting light which excites the photocatalyst.
2. Reactor according to Claim 1, **characterized** in that the radiation source is mounted on a radiation-transparent wall or in the interior of the reactor vessel and the mixing means is suitable for conveying the MR from the interior of the reactor vessel to the radiation source and back.
3. Reactor according to Claim 1, **characterized** in that the means of supplying electromagnetic radiation is composed of a lamp and a fluid channel which communicates with the reactor vessel via transport lines and conveying means for the microradiators.
4. Reactor according to Claim 3, **characterized** in that the lamp is of rod-shaped design and is surrounded by the fluid channel in the form of a jacket.
5. Reactor according to Claim 3 or 4, **characterized** in that the reactor vessel is provided with means for separating the MR from the PC and/or from the reaction medium.
6. Reactor according to Claims 1 to 5, for the oxidation of organic impurities in water or wastewater, **characterized** in that feed lines are provided for air or oxygen and exhaust lines for the waste gases.

7. Reactor according to Claims 1 to 6, **characterized** in that the reactor vessel is a fluidized bed reactor, a continuous-flow or tube reactor, a fixed bed reactor or a stirred tank reactor.
8. Reactor according to Claims 1 to 7, **characterized** in that the PC have a particle diameter of from 1 nm to 100  $\mu\text{m}$  in suspension reactors or from 1  $\mu\text{m}$  to 1 mm in fluidized-bed reactors or fixed-bed reactors.
9. Reactor according to Claims 1-8, **characterized** in that the MR have a phosphorescence half-life of from 5 seconds to 30 minutes and a particle size of from 1 nm to 1 mm, preferably from 10  $\mu\text{m}$  to 0.5 mm.
10. MR for use in reactors according to one of Claims 1 to 9, **characterized** in that they consist of a phosphorescent material which has been applied to a support and covered where appropriate with a radiation-transparent layer.
11. MR according to Claim 10, **characterized** in that the support consists of magnetic material.
12. Process for carrying out photocatalytic reactions, **characterized** in that solid PC have been suspended in the liquid or gaseous reaction medium or applied to a surface and are activated by means of microradiators (M) which are charged up at an electromagnetic radiation source and which emit this energy with a time delay.
13. Process according to Claim 12, **characterized** in that after emitting their energy the MR are conveyed past the radiation source again and recharged.

14. Process according to Claim 13, **characterized** in that the MR are separated from the PC and/or from the reaction medium before being passed to a separate radiation source and activated, before being then passed back into the reaction medium.
15. Process according to Claims 12 to 14, **characterized** in that the photocatalytic reaction is an oxidation of organic compounds in aqueous solution.
16. Process according to Claims 12 to 15, **characterized** in that the catalyst is TiO<sub>2</sub> particles and the MR are glass particles which have been doped with rare earth elements and can be excited with UV light or visible light.